The Integrated Command and Control System
A Tester's Perspective

Lt Col Shannon Sullivan
Commander
Detachment 1, 46th Test Squadron

Overview

- Background: ***ESC and Testers***
- The Challenge: ***Value Added***
- Benchmark Process: ***Combined Test Forces***
- Examples: ***JEFX, TBMCS, IWS***
- Lessons Learned: ***Communications, Infrastructure, Facilities, Involvement***
- Conclusion

Background at ESC

- 37 BC Stovepiped systems and information
- 1995 Fort Franklin
- 1996 The CUBE
- 1997 JEFX and Battlelabs
- 1999 Formation of CX

Integrated C2 Timeline

Requirements Acquisition Certification Field & Sustain

The Challenge: Adding Value to Acquisition and Operations

- IC2 Issues:
  - How do we insert Experimentation and Certification into the acquisition process?
  - How do we measure the impact of C2 systems being fielded?
  - How do we more effectively use technology and information?
- Test Contribution: Quantifying Value Adde
  (or lack thereof)

Integrated C2 Timeline

Requirements Acquisition Certification Field & Sustain

Background in the Test Community

In Jan 96, AF/TE tasked AFMC/DO to build a Blueprint that:

- Ensures the **RTO function** for C2 systems is performed with the same disciplined and structured approach as weapons/platforms
- Ensures the AF is properly training, building, and retaining **T&E expertise** for software intensive system of systems
- Shows how elements of a **T&E infrastructure** combine to provide a spectrum of capability through all phases of acquisition and sustainment

Blueprint Recommendations

- C2 Test Philosophy
  - C2 is the task; comm, computers, and ISR are the enabling technologies
  - C2 systems operate at different layers of command, each with their own decision set, timeline, and information needs
- Test Infrastructure
  - Link and leverage existing facilities (whether T&E facilities or not); upgrade facilities to accommodate identified T&E infrastructure shortfalls)
- Training
  - Develop C2 T&E Training Plan and C2 T&E Awareness Course
- Test Process
  - **Use C2 Combined Test Forces to adapt to short timeframes associated with spiral development**

Blueprint Recommendations

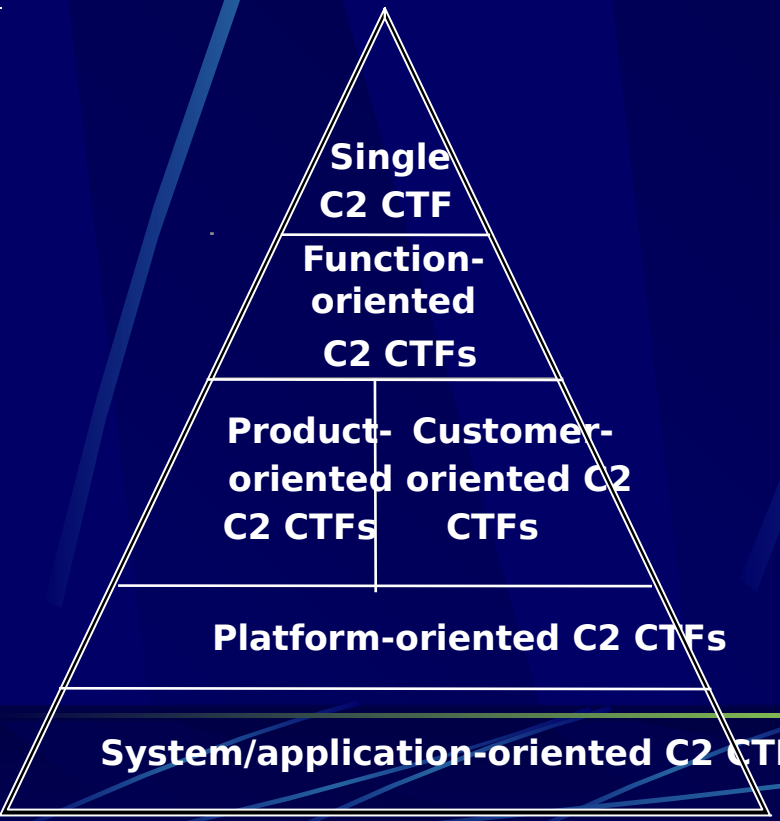
- C2 Test CONOPS (organizational roles/responsibilities)
  - ESC
    - Maintain CUBE as development/integration facility; make available to support DT&E
    - ESC/TE to manage the ESC test portfolio
  - C2TIG
    - Provide fielding recommendations for CAF C2 programs
    - Make facilities available to support DT&E
  - AFOTEC
    - Establish AFOTEC-OL at ESC
  - 46 TW (C2 DT&E Responsible Agent)
    - Manage C2 DT&E process
    - Establish test detachment at ESC
    - **Implement and institutionalize C2 Combined Test Forces**

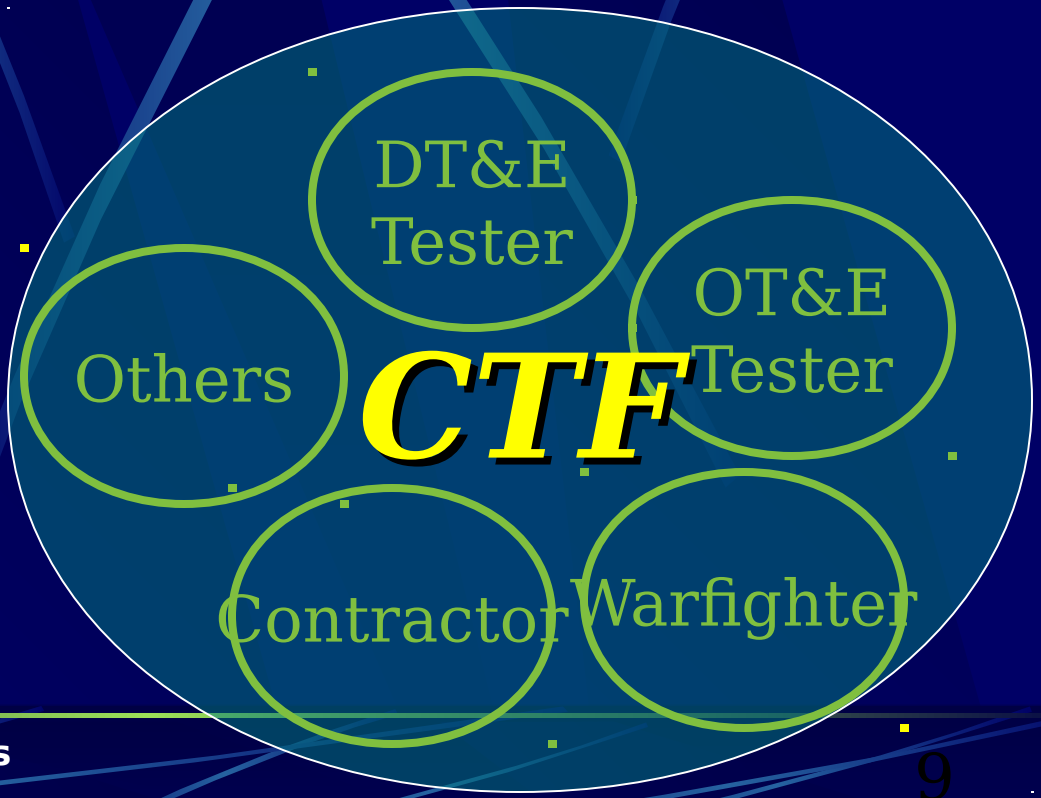
What Testers Bring to the Fight
Quantifying Value Added

- Disciplined process
- Streamlined method for collecting and analyzing data
- Technical assessment
- Suitability and Effectiveness assessment
- Interoperability and Integration evaluation

Benchmark Process: The Combined Test Force

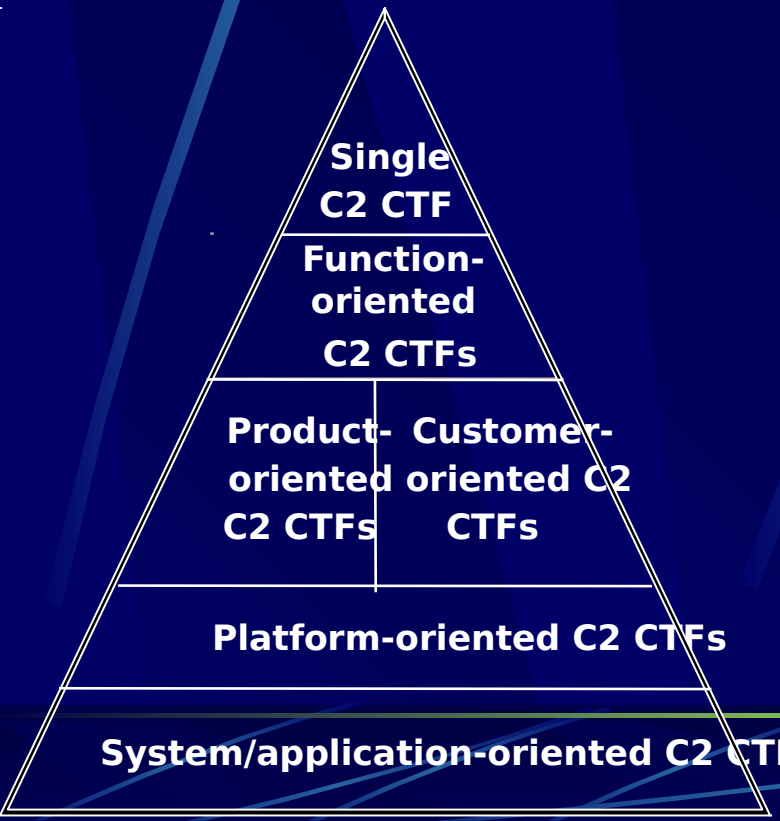
- **Key players in evaluating and fielding the sy**
- **Led by the Responsible Test Organization**
- **Involved from the beginning of the program**

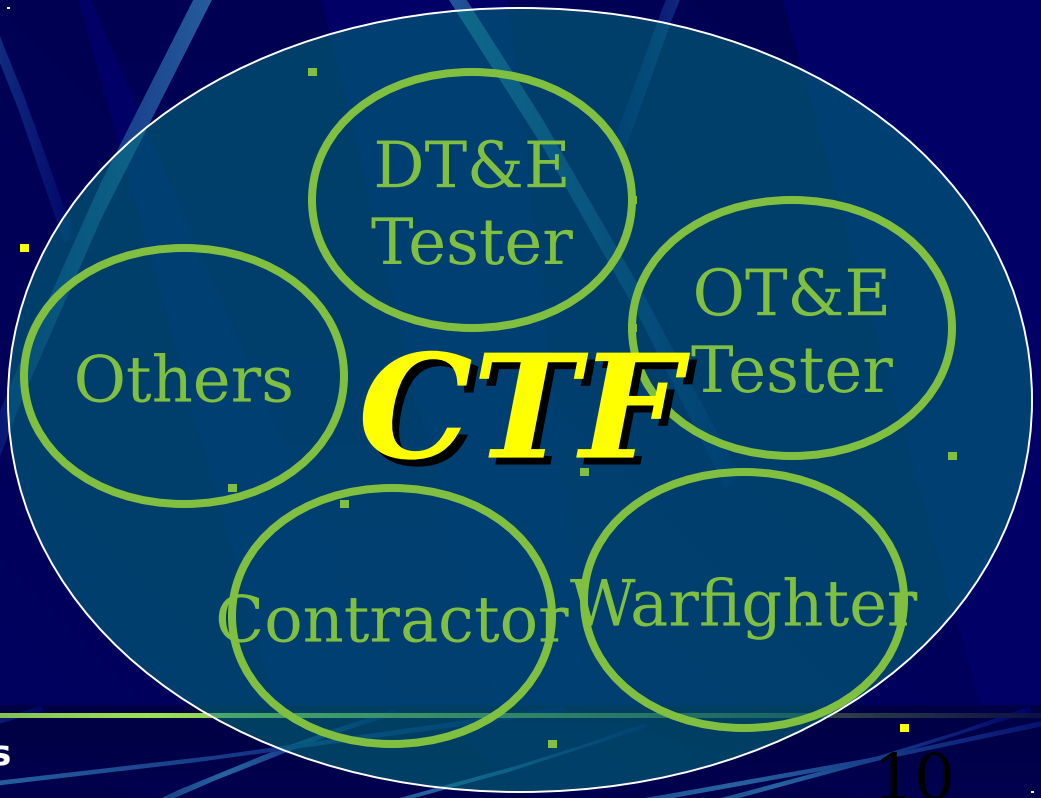




Combined Test Force Strengths

- **Clear testing objectives, processes, and met**
- **Maximize resources and minimize time**
- **Constant evaluation feedback**
- **No surprises**





CTF Location Models

- **Collocated**
  - All members located in near proximity
  - Preferred model (requires most investment)
  - Used for long duration programs
- **Distributed**
  - Members not collocated
  - Used for programs where each member may have significant test resources available and connectivity can be established between them
  - Used for short duration programs or where collocation is impractical
- **Roaming**
  - Members not collocated, but travel to test site(s) together

Combined Test Forces Examples Within Phases of IC2

- Requirements
  - JEFX
- Acquisition
  - TBMCS
- Certification
  - IWS

Warfighter Capability

Integrated C2 Timeline

Requirements Acquisition Certification Field & Sustain

Requirements

JEFX

Background

- Goal is to produce requirements
- Wide-scale experimentation
- Large operator participation
- Large assessment team headed by AF Experimentation Office

CTF Type

Collocated/Distributed/Roaming

Requirements: JEFX

- Issues
  - Determining evaluation criteria
  - Rapidly assessing value of an initiative
  - Coordinating large test teams
  - Reconciling and analyzing data
  - Producing executable information

Acquisition
Theater Battle Management Core Systems

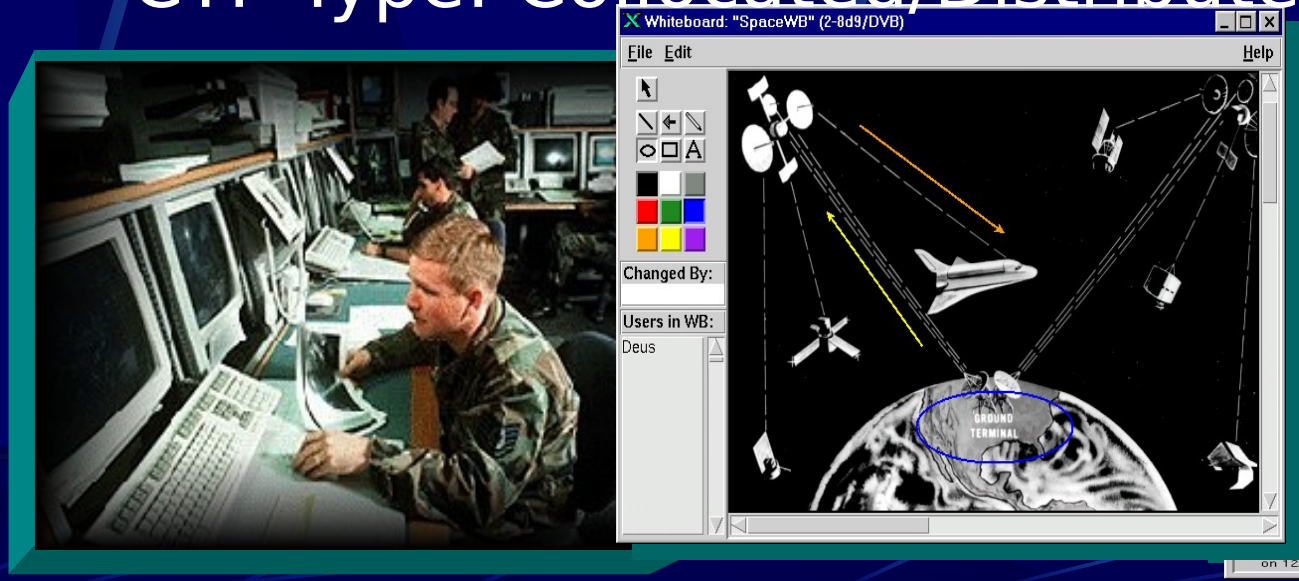
- Background
  - **Integration of Legacy Battle Management Functions:**
    - Combat Intel System (CIS),
    - Advanced Planning System (APS),
    - Wing Command and Control System (WCCS),
    - Air Support Operations Center (ASOC) Automation,
    - Contingency Theater Automated Planning System (CTAPS)
- CTF Type: Distributed
  - 46TS
  - USMC
  - AFOTEC
  - USN
  - 605TS
  - USA
  - ESC/ACT
  - USMC
  - Lockheed Martin

Acquisition
Theater Battle Management Core Systems

- Issues
  - Effective communication/coordination with distributed CTF members difficult
  - Operational manning to support test events not available due to Ops Tempo
  - Operational test platforms and test locations not available due to Ops Tempo and exercise demand

Certification InfoWorkSpace

- Background
  - Goal was to evaluate tool for fielding and Blue Flag
  - Functionality, interoperability, and load tests
  - Large assessment event in CUBE history (77 operators)
- CTF Type: Collocated/Distributed/Roaming



Certification InfoWorkSpace

- Issues
  - Highly compressed scheduled made planning and set-up difficult
  - Too many variables for effective assessment
  - No requirements or CONOPS to measure tool
  - Limited funding to support professional test team
  - Lacked distributed testbeds

Lessons Learned
Coordination & Communications

- Comm/coordination between distributed CTF members is difficult
- Closer proximity breeds efficiency
- Diverse CTFs allow availability of more expert personnel
- Deficiency Review process needs buy in from all members

Lessons Learned
Infrastructure/Requirements

- Requirements baseline critical and source/requirements documents must be current
- System configuration baseline must be stable
- Require realistic schedules
- Training/fielding responsibility for Joint programs must be assessed
- Test requires programmed funding

Lessons Learned
Facilities/Efficiencies

- Good testing (CTFs) will not “save” a program
- Combined DT/OT events allow DT’ers and OT’ers opportunity to share resources for different focuses
- Test facilities operationally representative saves time/cost/schedule
- Experienced test teams & facilities can adapt to similar test programs

Lessons Learned
CTF Involvement

- CTF (DT, OT, user) involvement early pays off -- Government oversight/ participation with initial contractor invaluable
- Require contractor & SPO buy-in for user, DT, OT involvement
- Contractor testing does not replace Gov't DT/OT
- COTS does not mean less testing - overall acquisition costs may be lower - COTS often requires *more* testing

Conclusion

- Effective IC2 development requires close cooperation with test community
- Combined Test Force Methodology forms testers, acquirers, operators, and industry into integrated team
- Successful operations depend on trust and cooperation